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Surface Modified Graphene Oxide Cross-linking with Hydroxyl-terminated Polybutadiene Polyurethane: Effects on Structure and Properties

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Abstract: Polyurethane (PU) based composites were fabricated by cross-linking hydroxyl-terminated polybutadiene (HTPB) chains with modified graphene oxide (MGO). The MGO worked as both the reinforcing agent and the cross-linker and strong interface between MGO sheets and PU matrix was formed, which provide the MGO/PU composites with well improved properties. Compared to neat PU and traditional direct-mixing GO/PU composites, the elastic modulus and tensile strength of 1 wt% MGO/PU composites increase significantly by 195.3% and 63.8%, respectively. Other properties such as thermal stability, anti-creep property and dynamic shear moduli are also much improved. All the improvements come from the enhanced interface bonding between MGO and PU, as well as dense molecular chains network in the composites. It can be expected that cross-linking method would be an effective fabrication approach and interface controlling strategy for the development of high-performance composites.

Keywords: A. Polymer-matrix composites; A. Graphene; D. Mechanical testing; B. Thermomechanical

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